CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: November 2, 2021

TO: Angela Parkhurst – WCR/Eau Claire

FROM: Benjamin Hartenbower – WCR/Eau Claire

SUBJECT: Water Quality-Based Effluent Limitations for Cady Cheese, LLC
WPDES Permit No. WI-0053597

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for a surface water discharge from Cady Cheese, LLC in St. Croix County. This industrial discharge is to Lohn Creek, located in the Eau Galle River Watershed in the Lower Chippewa River Basin. The evaluation of the permit recommendations is discussed in more detail in the attached report.

Based on our review, the following recommendations are made on a chemical-specific basis.

Outfall 005:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD_5	40 mg/L 8.4 lbs/day			20 mg/L 3.7 lbs/day		3,4
TSS	40 mg/L 10.5 lbs/day			20 mg/L 4.6 lbs/day		3,4
pH	9.0 s.u.	6.0 s.u.				
Dissolved Oxygen		4.0 mg/L				3
Ammonia Nitrogen						2
Temperature	86 deg F					1
Phosphorus						2
Chloride						2
Total Dissolved Solids						2
Total Nitrogen			10 mg/L			1
TKN, Nitrate+Nitrite						1,2
Acute WET						5
Chronic WET						6

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. These limits are based on the Limited Aquatic Life (LAL) community of the immediate receiving water as described in s. NR 104.02(3)(b), Wis. Adm. Code.
4. The mass limits are categorical limits based on ch. NR 240, Wis. Adm. Code. Weekly monitoring of BOD_5 and TSS is recommended to meet the minimum monitoring for this industrial category.
5. Two acute WET tests are recommended in the reissued permit. Tests should be done in rotating

quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued). According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests.

6. Three chronic WET tests are recommended in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued). The Instream Waste Concentration (IWC) to assess chronic test results is 100%. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 75%, 50%, 25% & 12.5% and the dilution water used in WET tests conducted on Outfall 005 shall be a grab sample collected from Lohn Creek.

Outfall 006: Non-Contact Cooling Water

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD_5						1,2
pH	9.0 s.u.	6.0 s.u.				1
Temperature	86 deg F					

Footnotes:

1. No changes from the current permit.
2. Monitoring only.

Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are not required due to the non-continuous nature of the discharge.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Benjamin Hartenbower at (715) 225-4705 or Benjamin.Hartenbower@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (2) – Narrative & Map

PREPARED BY: _____ Date: 11/2/2021

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Attachment #1

Water Quality-Based Effluent Limitations for
Cady Cheese, LLC

WPDES Permit No. WI-0053597

Prepared by: Benjamin P. Hartenbower

PART 1 – BACKGROUND INFORMATION

Facility Description:
Cady Cheese, LLC is a cheese manufacturing plant that uses 559,000 to 645,000 pounds of raw milk per day of production. Outfall 006 is non-contact cooling water used for cooling bulk starter, then it can be put in silo #6 or sent to outfall 006. Outfall 005 is discharge from the RO polisher. In the whey stream the cream, WPC, and permeate are removed, the water is then sent to the polisher, then it is sent to silo #6 for reuse or sent to the next RO for discharge at outfall 005.

Attachment #2 is a map of the area showing the approximate location of Outfall 005 and Outfall 006.

Existing Permit Limitations: The current permit, expiring on December 31, 2021 includes the following effluent limitations and monitoring requirements.

Outfall 005:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						2
BOD_5	40 mg/L			20 mg/L		1,3
TSS	40 mg/L			20 mg/L		1,3
pH	9.0 s.u.	6.0 s.u.				
Dissolved Oxygen		4.0 mg/L				1,3
Ammonia Nitrogen						2
Chloride						2
Total Dissolved Solids						2
Phosphorus						2
Temperature	86 deg F					
Total Nitrogen			10 mg/L			1
TKN, Nitrate+Nitrite						1,2

Footnotes:

1. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
2. Monitoring only
3. These limits are based on the Limited Aquatic Life (LAL) community of the immediate receiving water as described in s. NR 104.02(3)(b), Wis. Adm. Code.

Outfall 006: Non-Contact Cooling Water

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD_5						1
pH	9.0 s.u.	6.0 s.u.				
Temperature	86 deg F					

Footnotes:

1. Monitoring only

Receiving Water Information:

- Name: Lohn Creek
- Waterbody Identification Code (WBIC): 5011778
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Limited Aquatic Life (LAL) community, non-public water supply.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: Due to the nature of the receiving water, 7-Q_{10}, 7-Q_2, and Harmonic Mean are estimated to be zero.
  7-Q_{10} = 0 cfs (cubic feet per second)
  7-Q_2 = 0 cfs
  Harmonic Mean Flow = 0 cfs
- Hardness = <1 mg/L as $CaCO_3$. Effluent hardness is used in place of receiving water because there is no receiving water flow upstream of the discharge.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: Not applicable where the receiving water low flows are zero.
- Source of background concentration data: Background concentrations are not included because they don't impact the calculated WQBEL when the receiving water low flows are equal to zero.
- Multiple dischargers: None
- Impaired water status: Lake George is downstream of Lohn Creek and is listed as impaired for total phosphorus.

Effluent Information:

Outfall 005:

- Flow Rate(s): Peak annual average (Outfall 005) = 0.0325 MGD (Million Gallons per Day)
  For reference, the actual average flow from January 2012 to April 2017 was 0.0294 MGD (Outfall 005).
- Hardness = <1 mg/L as $CaCO_3$. This value represents the effluent data submitted with the permit application.
- Acute dilution factor used in accordance with s. NR 106.06 (3) (c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water Source: Reverse Osmosis process water with water supply from wells
- Additives: Food Grade Caustic for pH control (water quality conditioner)
- Effluent characterization: This facility is categorized as a secondary industry, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus hardness. The permit-required monitoring for ammonia, chloride, and phosphorus January 2017 to July, 2021 is used in this evaluation.

Outfall 006:

- Flow Rate(s): Peak annual average (Outfall 006) = 0.030 MGD
  For reference, the actual average flow from January 2017 to July 2021 was and 0.0029 MGD.
- Acute dilution factor used in accordance with s. NR 106.06 (3) (c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water Source: Noncontact Cooling Water supplied from wells
- Additives: None
- Effluent characterization: This discharge is categorized as noncontact cooling water discharge, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily Ammonia, Chloride, and Phosphorus.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled "MEAN EFFL. CONC.". Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

Sample Date	Copper µg/L
04/22/2021	<3
04/26/2021	<3
04/29/2021	<3
05/06/2021	<3
Mean	<3

"<" means that the pollutant was not detected at the indicated level of detection. The mean concentration was calculated using zero in place of the non-detected results.

The following table presents the average concentrations and loadings at Outfall 005 from January 2012 to April 2017 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

	Average Measurement
BOD_5	5.5 mg/L*
TSS	<2 mg/L*
pH field	6.72 s.u.
Dissolved Oxygen	8.3 mg/L
Temperature	79 Deg F
Total Nitrogen	49 mg/L

*Results below the level of detection (LOD) were included as zeroes in calculation of average.

The following table presents the average concentrations and loadings at Outfall 006 from January 2017 to July 2021 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Attachment #1

	Average Measurement
pH field	7.08 s.u.
Temperature	84 Deg F

PART 2 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR TOXIC SUBSTANCES – EXCEPT AMMONIA NITROGEN

Permit limits for toxic substances are required whenever any of the following occur:

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or P_{99}) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q_{10}

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Adm. Code, (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q_{10} receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

$$\text{Limitation} = \frac{(WQC)\,(Qs + (1-f)\,Qe) - (Qs - f\,Qe)\,(Cs)}{Qe}$$

Where:

WQC =Acute toxicity criterion or secondary acute value according to ch. NR 105, Wis. Adm. Code.

Qs = average minimum 1-day flow which occurs once in 10 years (1-day Q_{10}) if the 1-day Q_{10} flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q_{10}).

Qe = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

f = Fraction of the effluent flow that is withdrawn from the receiving water, and

Cs = Background concentration of the substance (in units of mass per unit volume) as specified in s. NR 106.06(4)(e), Wis. Adm. Code.

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q_{10} method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is the case for Cady Cheese, Inc.

The following tables list the calculated water quality-based effluent limitations for this discharge along with the results of effluent sampling. All concentrations are expressed in terms of micrograms per Liter (µg/L), except for hardness and chloride (mg/L).

Daily Maximum Limits based on Acute Toxicity Criteria (ATC) for Outfall 005

RECEIVING WATER FLOW = 0 cfs, (1-Q_{10} (estimated as 80% of 7-Q_{10})), as specified in s. NR 106.06 (3) (bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD.* mg/L	ATC	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Chlorine		19.0	19.0	3.81	<100		
Arsenic		339.8	339.8	68.0	<1.0		
Cadmium	6	1.2	1.2	0.2	<2		
Chromium	13	339	339	68	<3		
Copper	13	2.3	2.3	0.5	<3		
Lead	12	13.8	13.8	2.8	<1		
Nickel	13	83.5	83.5	17	<8		
Zinc	12	18.8	18.8	3.8	<8		
Chloride (mg/L)		757	757	151	<2		

* The indicated hardness may differ from the effluent hardness because the effluent hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the acute criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

* * Per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016 consideration of ambient concentrations and 1-Q_{10} flow rates yields a more restrictive limit than the 2 × ATC method of limit calculation.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC) for Outfall 005

RECEIVING WATER FLOW = 0 cfs (¼ of the 7-Q_{10}), as specified in s. NR 106.06 (4) (c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Chlorine		7.28		7.28	1.46	<100	
Arsenic		152.2		152.2	30.4	<1.0	
Cadmium	6	0.27		0.27	0.09	<2	
Chromium	13	24.9		24.9	5.0	<3	
Copper	13	1.81		1.81	0.36	<3	
Lead	12	3.61		3.61	0.7	<1	
Nickel	13	13.1		13.1	2.6	<8	
Zinc	13	20.2		20.2	4.0	<8	
Chloride (mg/L)		395		395	79.0	<2	

* The indicated hardness may differ from the receiving water hardness because the receiving water hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the chronic criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

Monthly Average Limits based on Wildlife Criteria (WC) for Outfall 005

The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

Monthly Average Limits based on Human Threshold Criteria (HTC) for Outfall 005

RECEIVING WATER FLOW = 0 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	880		880	176	<2
Chromium (+3)	8400000		8400000	1680000	<3
Lead	2240		2240	448	<1
Nickel	110000		110000	22000	<8

Monthly Average Limits based on Human Cancer Criteria (HCC) for Outfall 005

RECEIVING WATER FLOW = 0 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	40.0		40.0	8.0	<1.0

In addition to evaluating the need for limits for each individual substance for which HCC exist, s. NR 106.06(8), Wis. Adm. Code, requires the evaluation of the cumulative cancer risk. Because no effluent limits are needed based on HCC, determination of the cumulative cancer risk is not needed per s. NR 106.06(8), Wis. Adm. Code.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC) for Outfall 006

RECEIVING WATER FLOW = 0 cfs, (1-Q_{10} (estimated as 80% of 7-Q_{10})), as specified in s. NR 106.06 (3) (bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD. mg/L	ATC	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Chlorine		19.0	19.0	3.81	<100		
Chloride (mg/L)		757	757	151	26		

* * Per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016 consideration of ambient concentrations and 1-Q_{10} flow rates yields a more restrictive limit than the 2 × ATC method of limit calculation.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC) for Outfall 006

RECEIVING WATER FLOW = 0 cfs (¼ of the 7-Q_{10}), as specified in s. NR 106.06 (4) (c), Wis. Adm. Code

SUBSTANCE	REF. HARD. mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Chlorine		7.28		7.28	1.46	<100	
Chloride (mg/L)		395		395	79.0	26	

Monthly Average Limits based on WC, HTC, and HCC for Outfall 006

The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria, Human Threshold Criteria, or Human Cancer Criteria exist.

Conclusions and Recommendations: Based on a comparison of the effluent data and calculated effluent limitations, no effluent limitations needed for toxic substances.

PART 3 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR AMMONIA NITROGEN

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. Given the fact that Cady Cheese, LLC does not currently have ammonia nitrogen limits, the need for limits is evaluated at this time.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)
Daily maximum limitations are based on acute toxicity criteria in ch. NR 105, Wis. Adm. Code, which are a function of the effluent pH and the receiving water classification. The acute toxicity criterion (ATC) for ammonia is calculated using the following equation:

$$\text{ATC in mg/L} = [A \div (1 + 10^{(7.204 - pH)})] + [B \div (1 + 10^{(pH - 7.204)})]$$

Where:

A = 0.633 and B = 90.0 for Limited Aquatic Life, and
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 286 sample results were reported from January 2012 to April 2017. The maximum reported value was 8.00 s.u. (Standard pH Units). The effluent pH was 7.00 s.u. or less 99% of the time. The 1-day P_{99}, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.43 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 7.40 s.u. Therefore, a value of 7.43 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 7.43 s.u. into the equation above yields an ATC = 33.95 mg/L.

Potential Changes to Daily Maximum Ammonia Nitrogen Effluent Limitations
Subchapter IV of ch. NR 106, Wis. Adm. Code (effective September 1, 2016) specifies methods for the use of the 1-Q_{10} receiving water low flow to calculate daily maximum ammonia nitrogen limits if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. The more restrictive calculated limits shall apply.

The calculated daily maximum ammonia nitrogen effluent limits using the mass balance approach with the 1-Q_{10} (estimated as 80 % of 7-Q_{10}) and the 2×ATC approach are shown below.

Daily Maximum Ammonia Nitrogen Determination

	Ammonia Nitrogen Limit mg/L
2×ATC	67.89
1-Q_{10}	33.95

The 1-Q_{10} method yields the most stringent limits for Cady Cheese, LLC.

Presented below is a table of daily maximum limitations corresponding to various effluent pH values. Use of this table is not necessarily recommended in the permit, but it is presented herein for informational purposes.

Daily Maximum Ammonia Nitrogen Limits – LAL

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
$6.0 \leq pH \leq 6.1$	83	$7.0 < pH \leq 7.1$	51	$8.0 < pH \leq 8.1$	11
$6.1 < pH \leq 6.2$	82	$7.1 < pH \leq 7.2$	46	$8.1 < pH \leq 8.2$	8.8
$6.2 < pH \leq 6.3$	80	$7.2 < pH \leq 7.3$	40	$8.2 < pH \leq 8.3$	7.3
$6.3 < pH \leq 6.4$	78	$7.3 < pH \leq 7.4$	35	$8.3 < pH \leq 8.4$	6.0
$6.4 < pH \leq 6.5$	75	$7.4 < pH \leq 7.5$	31	$8.4 < pH \leq 8.5$	5.0
$6.5 < pH \leq 6.6$	72	$7.5 < pH \leq 7.6$	26	$8.5 < pH \leq 8.6$	4.1
$6.6 < pH \leq 6.7$	69	$7.6 < pH \leq 7.7$	22	$8.6 < pH \leq 8.7$	3.4
$6.7 < pH \leq 6.8$	65	$7.7 < pH \leq 7.8$	19	$8.7 < pH \leq 8.8$	2.8
$6.8 < pH \leq 6.9$	60	$7.8 < pH \leq 7.9$	16	$8.8 < pH \leq 8.9$	2.4
$6.9 < pH \leq 7.0$	56	$7.9 < pH \leq 8.0$	13	$8.9 < pH \leq 9.0$	2.0

Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)
Weekly average and monthly average limits for ammonia nitrogen are based on chronic toxicity criteria in ch. NR 105, Wis. Adm. Code.

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as Limited Aquatic Life is calculated by the following equation, according to subchapter IV of NR 106, Wis. Adm. Code.

$$CTC = E \times \{[0.0676 \div (1 + 10^{(7.688 - pH)})] + [2.912 \div (1 + 10^{(pH - 7.688)})]\} \times C$$

Where:

pH = the pH (s.u.) of the receiving water,
E = 1.0,
$C = 8.09 \times 10^{(0.028 \times (25 - T))}$
T = the temperature of the receiving (ºC)

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q_{10} (4-Q_3, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q_5 (estimated as 85% of the 7-Q_2 if the 30-Q_5 is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the flow is used if the Temperature ≥ 16 ºC, 25% of the flow is used if the Temperature < 11 ºC, and 50% of the flow is used if the Temperature ≥ 11 ºC but < 16 ºC.

The "default" basin assumed values are used for Temperature, pH and background ammonia concentrations, because minimum ambient data is available. These values are shown in the table below, with the resulting criteria and effluent limitations.

Attachment #1

Weekly and Monthly Ammonia Nitrogen Limits – LAL

		Spring	Summer	Winter
		April & May	June – Sept.	Oct. - March
Effluent Flow	Qe (MGD)	0.02	0.02	0.02
Background Information	7-Q_{10} (cfs)	0.0	0.0	0.0
	7-Q_2 (cfs)	0.0	0.0	0.0
	Ammonia (mg/L)	--	--	--
	Temperature (°C)	15	21	13
	pH (s.u.)	8.09	8.08	7.98
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	0	0	0
	Reference Monthly Flow (cfs)	0	0	0
Criteria mg/L	4-day Chronic	33.72	23.93	45.76
	30-day Chronic	13.49	9.57	18.30
Effluent Limits mg/L	Weekly Average	34	24	46
	Monthly Average	13	9.6	18

Effluent Data

The following table evaluates the statistics based upon ammonia data reported at Outfall 005 from January 2012 to April 2017, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Cady Cheese, LLC permit for the respective month ranges.

	Ammonia Nitrogen mg/L
1-day P_{99}	0.3
4-day P_{99}	0.2
30-day P_{99}	0.1
Mean*	0.1
Std	0.05
Sample size	24
Range	<0.1-0.2

*Values lower than the level of detection were substituted with a zero

A single sample for ammonia nitrogen was taken on 04/28/2021with a result 0.5 mg/L submitted with the permit application for Outfall 006.

Based on this comparison, there is no reasonable potential for either discharge to exceed any of the calculated ammonia nitrogen limits. No limits are needed, however monitoring is recommended to continue at Outfall 005.

PART 4 – PHOSPHORUS

Technology-Based Effluent Limit

Subchapter II of Chapter NR 217, Wis. Adm. Code, requires industrial wastewater treatment facilities that discharge greater than 60 pounds of Total Phosphorus per month to comply with a 12-month rolling average limit of 1.0 mg/L, or an approved alternative concentration limit.

Because Cady Cheese, LLC does not currently have an existing technology-based limit, the need for this limit in the reissued permit is evaluated. The data demonstrates that the annual monthly average phosphorus loading is less than 60 lbs/month, which is the threshold for industrial facilities in accordance to s. NR 217.04(1)(a)2, Wis. Adm. Code, and therefore a technology-based limit is not required.

Annual Average Mass Total Phosphorus Loading

Month	Result mg/L	Monthly Avg. mg/L	Total Phosphorus lb./mo.
04/26/2012	<0.1	0.0325	--
10/23/2012	<0.05	0.0325	--
04/02/2013	<0.05	0.003	--
08/27/2013	<0.05	0.0275	--
02/15/2016	<0.05	0.015	--
03/22/2017	<0.05	0.02	--

Total P (lbs/month) = Monthly average (mg/L) × total flow (MG/month) × 8.34 (lbs/gallon)
Where total flow is the sum of the actual (not design) flow (in MGD) for that month

In addition, the need for a WQBEL for phosphorus must be considered.

Water Quality-Based Effluent Limits (WQBEL)

Revisions to administrative rules regulating phosphorus took effect on December 1, 2010. These rule revisions include additions to s. NR 102.06, Wis. Adm. Code, which establish phosphorus standards for surface waters. Subchapter III of NR 217, Wis. Adm. Code, establishes procedures for determining WQBELs for phosphorus, based on the applicable standards in ch. NR 102, Wis. Adm. Code.

Phosphorus criteria in s. NR 102.06, Wis. Adm. Code, do not apply to limited aquatic life waters as described in s. NR 102.06(6)(d), Wis. Adm. Code. These waters were not included in the USGS/WDNR stream and river studies and, therefore, the Department lacked the technical basis to determine and propose applicable criteria. At some time in the future, the Department may adopt phosphorus criteria based on new studies focusing on limited aquatic life waters. The Guidance for Implementing Wisconsin's Phosphorus Water Quality Standards for Point Source Discharges (2020) suggests that during the interim, WQBELs should be based on the criteria and flow conditions for the next stream segment downstream (or downstream lake or reservoir, if appropriate), because ss. 217.12 and 217.13, Wis. Adm. Code, state that the Department must set WQBELs to protect downstream waters. The discharge location of the wastewater from Cady Cheese, LLC is classified as limited aquatic life because Lohn Creek can by classified hydraulically as diffuse surface water in the absence of a discharge as defined in s. NR 104.02(1)(b), Wis. Adm. Code. Due to stream bed seepage, the low volume intermittent flow of effluent does not impact downstream surface water resources. Therefore, no water-quality based phosphorus limits are warranted for inclusion in the permit. The current **monitoring frequency for Outfall 005 is recommended to continue.**

PART 5 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in Chapters NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. The daily maximum effluent temperature limitation shall be 86 °F for discharges to surface waters classified as Limited Aquatic Life according to s. NR 104.02(3)(b)1, Wis. Adm. Code, except for those classified as wastewater effluent channels and wetlands regulated under ch. NR 103 and described in s. NR 106.55(2), Wis. Adm. Code, which has a daily maximum effluent temperature limitation of 120 °F. The 86 °F limit applies to the diffuse surface water classification defined in s. NR 104.02(1)(b), Wis. Adm. Code. For Outfalls 005 and 006, the current **limits and monitoring are recommended to continue.**

PART 6 – WHOLE EFFLUENT TOXICITY (WET)

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. Decisions below related to the selection of representative data and the need for WET limits were made according to ss. NR 106.08 and 106.09, Wis. Adm. Code. WET monitoring frequency and toxicity reduction evaluation (TRE) recommendations were made using the best professional judgment of staff familiar with the discharge after consideration of the guidance in the *Whole Effluent Toxicity (WET) Program Guidance Document (October 29, 2019).*

Outfall 006:
Outfall 006 is comprised primarily of noncontact cooling water and no additives have been declared. This discharge does not have a history of WET failures and no toxic compounds are expected at levels of concern. Since there is believed to be a very low risk of toxicity, WET testing is not recommended during the reissued permit term.

Outfall 005:

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC_{50} (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.

- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC_{25} (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 100% shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

$$IWC\ (as\ \%) = Q_e \div \{(1 - f)\ Q_e + Q_s\} \times 100$$

Where:

Q_e = annual average flow = 0.0325 MGD = 0.050 cfs
f = fraction of the Q_e withdrawn from the receiving water = 0
Q_s = 0 cfs

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 005 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge . The specific receiving water location must be specified in the WPDES permit.

The WET checklist was developed to help DNR staff make recommendations regarding WET limits, monitoring, and other related permit conditions. The checklist indicates whether acute and chronic WET limits are needed, based on requirements specified in s. NR 106.08, Wis. Adm. Code. The checklist steps the user through a series of questions, assesses points based on the potential for effluent toxicity, and suggests monitoring frequencies based on points accumulated during the checklist analysis. As toxicity potential increases, more points accumulate, and more monitoring is recommended to ensure that toxicity is not occurring. A summary of the WET checklist analysis completed for this permittee is shown in the table below. Staff recommendations based on best professional judgment are provided below the summary table. For guidance related to reasonable potential and the WET checklist, see Chapter 1.3 of the WET Guidance Document: https://dnr.wisconsin.gov/topic/Wastewater/WET.html.

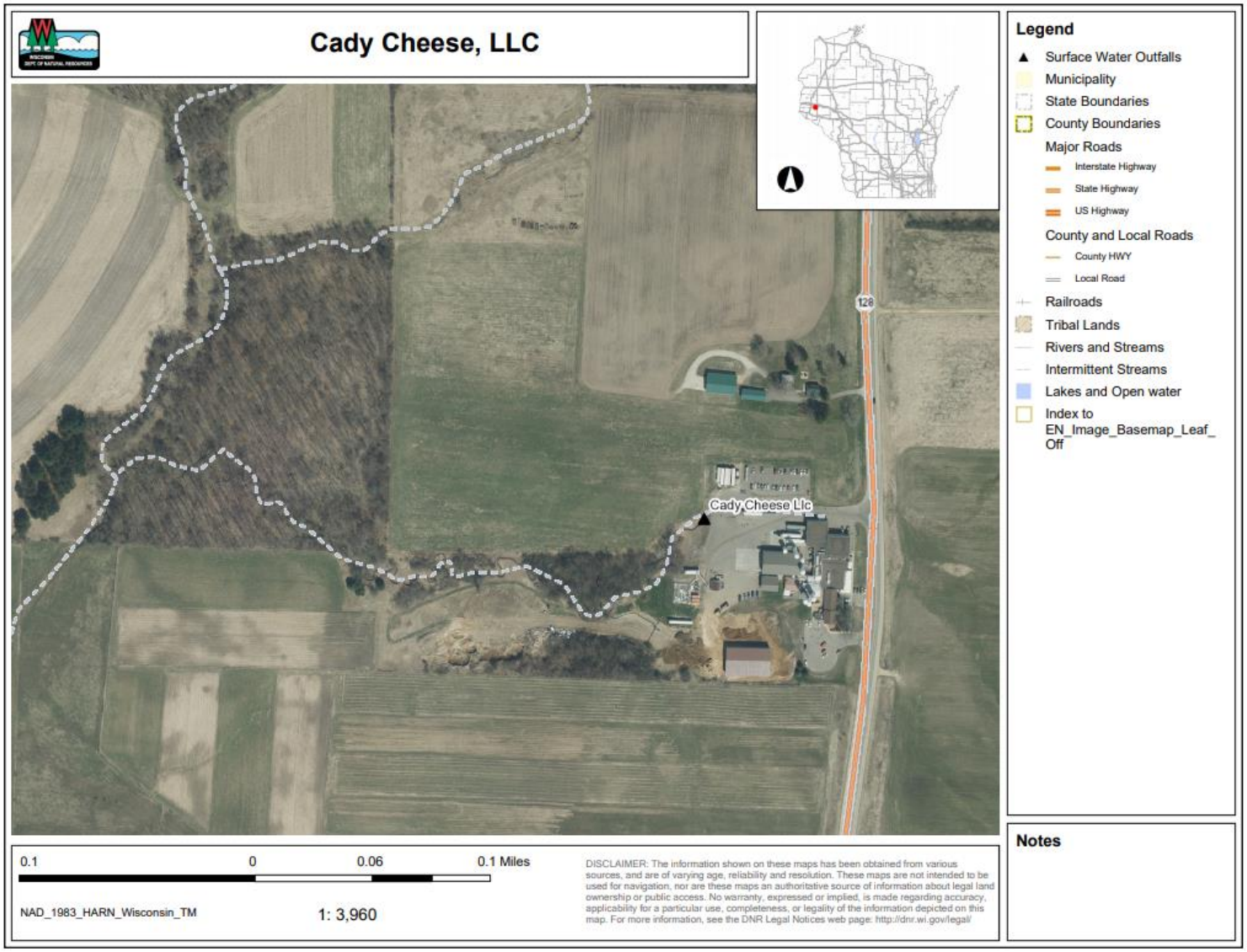
WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. **0 Points**	IWC = 100 %. **15 Points**
Historical Data	No tests used to calculate RP. **5 Points**	No tests used to calculate RP. **5 Points**
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. **0 Points**	Same as Acute. **0 Points**
Receiving Water Classification	Variance Water with < 4 mi to non-variance water (5 pts) **5 Points**	Same as Acute. **5 Points**
Chemical-Specific Data	No reasonable potential limits for substances based on ATC; Ammonia detected. (1 pt) Additional Compounds of Concern: None **1 Point**	No reasonable potential limits for substances based on CTC; Ammonia detected. (1 pt) Additional Compounds of Concern: None **1 Point**

Attachment #1

	Acute	Chronic
Additives	No Biocides and 1 Water Quality Conditioner added. (1 pt) P treatment chemical other than Ferric Chloride (FeCl), Ferrous Sulfate ($FeSO_4$), or alum used: No **1 Points**	Additive used more than once per 4 days. **1 Point**
Discharge Category	Cheese Production (5 pts) **5 Points**	Same as Acute. **5 Points**
Wastewater Treatment	Secondary or Better **0 Points**	Same as Acute. **0 Points**
Downstream Impacts	No impacts known **0 Points**	Same as Acute. **0 Points**
Total Checklist Points:	**17 Points**	**31 Points**
Recommended Monitoring Frequency (from Checklist):	2 tests during permit term (year 2, 4, 6, etc.)	3 tests during permit term (year 1, 3, 5, etc.)
Limit Required?	No	No
TRE Recommended? (from Checklist)	No	No

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2019) and other information described above **two acute and three chronic WET tests are recommended in the reissued permit.**. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).


Cady Cheese, LLC
Cady Cheese Llc
128
Legend
Surface Water Outfalls
Municipality
State Boundaries
County Boundaries
Major Roads
Interstate Highway
State Highway
US Highway
County and Local Roads
County HWY
Local Road
Railroads
Tribal Lands
Rivers and Streams
Intermittent Streams
Lakes and Open water
Index to EN_Image_Basemap_Leaf_Off
Notes
0.1
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